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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,553	10/02/2003	Wenjun Zeng	TAL:7146.0172	2535

47915 7590 11/29/2005

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EXAMINER	
HUNG, YUBIN	
ART UNIT	**PAPER NUMBER**
2625	

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. ✓10/678,553	Applicant(s) ZENG ET AL.	
	Examiner Yubin Hung	Art Unit 2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 9-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9* is/are allowed.

6)☒ Claim(s) *1-3,5,6 and 10-13* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ✓☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment/Arguments

1. Claims 1-6 and 9-13 are still pending.

2. In view of the applicant's cancellation, the 35 USC § 112 rejections of claims 1-6 and 9-13 have been withdrawn.

3. Applicant's amendment fails to overcome the double patenting issues raised in the Office Action mailed 05/13/2005 because the amended claim 1 is not distinguished from its previously presented version. Therefore, the double patenting objection is maintained. Specifically:

3.1 The phrase "to improve perceived image quality" that is added to amended claim 1 carries no weight because a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

3.2 The phrase "increasing the lossiness of compression at higher frequencies relative to the lossiness at lower frequency by" added to step (f) of claim 1 merely describes, again, the *intended use or result* of the action that follows (i.e., the remainder of the paragraph: "varying said...transform coefficients.") and carries no weight, as discussed in 4.1 above. (Therefore, Applicant's argument in page 8, 3rd paragraph of the response filed 10/17/2005 is not persuasive.)

3.3 The "action" differs from the previously presented version by replacing "decreasing" with "increasing" in line 4 of step (f), "lower" with "higher" in line 5 and "higher" with "lower" in the last two lines. However, it would have been obvious to one of ordinary skill in the art at the time of the invention that if a range included in a first quantization step comprising **lower** frequency transform coefficients is **decreased** relative to a range included in a second quantization step comprising **higher** frequency transform coefficients, then the converse is also true; namely, a range included in a first quantization step comprising **higher** frequency transform coefficients is **increased** relative to a range included in a second quantization step comprising **lower** frequency transform coefficients.

4. Regarding Applicant's arguments (page 7, last paragraph through page 8, 4th paragraph of the response filed 10/17/2005), since they are directed to the amendment discussed above, the discussions in 3.1-3.3 therefore are proper responses to those arguments.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

5. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 17, 2005 has been entered.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 10, and similarly claims 11-13, is constructed to depend from claim 9. Since claim 10 inherits all limitations of claim 9, it in particular inherits the condition for carrying out step (f) of claim 9 (see the last three lines of claim 6, that is, "if a peak-to-mean...basis function"). However, claim 10 recites another, potentially incompatible

condition for carrying out the same action (see "as said distortion of said image increases" on the last line of claim 10). It is not clear whether either or both conditions have to be satisfied in order for the action to be carried out. Consequently, claim 10, and similarly claims 11-13, is indefinite. **[Note: For examination purpose, claims 10-13 will be interpreted as independent claims identical to claim 9 with the exception that the condition for carrying out step (f) in claim 9 is replaced by the condition specified in each of claims 10-13.]**

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-3, 5, 6 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arean et al (US 6,253,185), in view of Fukuda et al. (US 6,532,262) and Tokunaga et al. (JP 01-129589, with English abstract).

Regarding claim 1, Arean discloses

- transforming an image datum to a datum transform coefficient [Fig. 1 (input signal types, including image); Fig. 8, numeral 104; Col. 11, lines 59-67]
- varying a range of a plurality of transform coefficients included between a lower frequency limit and a higher frequency limit of a quantization step

`[Fig. 8, numeral 107; Col. 12, lines 18-32. Note that each factor` *band* `is by definition bounded by a low frequency limit and a high frequency limit and includes a range of transform coefficients]`

Arean does not expressly disclose

- `measuring a distortion of an image and uses the measurement to vary a range of transform coefficients`
- `identifying a quantization step comprising a range of transform coefficients inclusive of said datum transform coefficient`
- `substituting for said datum transform coefficient a quantizer index representing said transform coefficients of said range included in said quantizer step`
- `increasing the lossiness of compression at higher frequencies relative to the lossiness at lower frequencies by varying a range of a plurality of transform coefficients as a function of said distortion of said image data comprising the step of increasing said range included in a first quantization step comprising higher frequency transform coefficients relative to a range included in a second quantization step comprising lower frequency transform coefficients`

However, in [Fig. 13, numerals 302, 303; Col. 19, lines 39-61 and Col. 20, lines 35-42] Fukuda teaches estimating (measuring) distortion sensitivity (equivalent to distortion; see Col. 19, lines 54-57) of an image and subsequently decreasing the quantization parameter (i.e., decreasing the range of coefficients) when the distortion sensitivity index is large and vice versa. In addition, the well-known uniform threshold quantization technique (see for example the admitted prior art shown as Fig. 3 of the application) teaches identifying the quantization interval in which the coefficient of interest falls and substitute it with the corresponding quantization index.

In addition, Tokunaga teaches that when setting a quantization step (and therefore the range included in the quantization step), make the step for low-frequency components smaller than the step for the high-frequency components. [See the last two lines of the

English abstract]. (Note that Fukuda already teaches decreasing quantization steps as distortion increases.)

Arean, Fukuda and Tokunaga are combinable because they are from the same field of endeavor of adaptively adjusting quantization parameters.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Arean with the teachings of Fukuda and Tokunaga by decreasing the quantization parameter when the distortion sensitivity index (equivalent to distortion) is large and setting the quantization step for low-frequency component smaller than that for the high-frequency components as well as using the well-known uniform threshold quantization and by setting the quantization step for low-frequency component smaller than that for the high-frequency components. The motivation would have been to minimize the distortion perceptible by a human throughout the frequency range as well as to reduce risk by using a well known, and thus proven, quantization technique.

Therefore, it would have been obvious to combine Tokunaga with Arean and Fukuda to obtain the invention of claim 1.

11. Regarding claim 2, and similarly interpreted claim 10, Tokunaga further discloses

- `increasing said range included in a first quantizer step comprising higher frequency transform coefficients relative to a range included in a second quantizer step comprising lower frequency transform coefficients` *`as said distortion of said image increases`*

> [See the last two lines of the English abstract. Note that per the analysis of claim 1 Fukuda already teaches decreasing quantization steps as distortion increases]

12. Regarding claim 3, and similarly interpreted claim 11, Fukuda further teaches decreasing quantization step if the distortion exceeds a threshold [Col. 20, lines 39-42. Note that the existence of a threshold is inherent since the adjustment is done if the distortion is "large"]

13. Regarding claim 5, and similarly interpreted claim 12, Fukuda further teaches rate control. [See Fig. 13, numeral 111 (same as Fig. 1, numeral 111); Col. 8, lines 55-58. Note that it is well known in the art that coarser quantization step decreases bit rate; therefore it would have been obvious to one of ordinary skill in the art that if bit rate decreases, then quantization step should be decreased in response in order to increase the bit rate; in this way a relatively constant bit rate is maintained.]

14. Claim 6, and similarly interpreted claim 13, is similarly analyzed and rejected as per claim 5 for being an obvious variation because thresholding (in this case, varying said range of coefficients only if a decrease in bit rate exceeds a threshold) is a well-known decision process.

Allowable Subject Matter

15. Claim 9 is allowed.

16. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. **[Note, however, the double patenting issue remains.]**

17. The following is a statement of reasons for the indication of allowable subject matter:

18. Regarding claim 4, and similarly claim 9, the prior art of record fails to teach or suggest, alone or in combination, a method of quantizing image data comprising, along with other limitations:

- `if a peak-to-mean amplitude of said distortion at least equals a frequency detection threshold of a basis function`

Closest art of record, Fukuda et al. (US 6,532,262), teaches decreasing quantization parameter (step) if the distortion is large in [Fig. 13, numerals 302, 303; Col. 19, lines 39-61 and Col. 20, lines 35-42]. However, it has not taught/suggested that "large" means the peak-to-mean amplitude of the measured distortion being at least equal to a frequency detection threshold of a basis function.

Contact Information

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung
Patent Examiner
November 22, 2005

KANJIBHAI PATEL
PRIMARY EXAMINER